

# National Levee Design and Monitoring Standards in the Netherlands



## National Levee Design and Monitoring Standards in the Netherlands

### Overview of Presentation

- Preface: NWP
- Brief (recent) history
- Legislative aspects
- Assessment in practice
- Results of the recent assessment
- Developments



## National Water Partnership

### Dutch water activities in the US

- Hurricane Katrina was wake-up call; catalysed demand for water expertise
- Exchange of knowledge and expertise; lessons learned for all parties
- Large contracts awarded in New Orleans
- Spin-off opportunities in California, Florida, New York



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## National Water Partnership

### Dutch companies in the USA

#### Present in the USA

- ARCADIS
- Fugro
- DHV
- Royal Haskoning
- Interbeton

#### Projects in the USA

- DeltaRes (Delft Hydraulics, GeoDelft, TNO)
- Alterra
- HKV Consultants
- Infram

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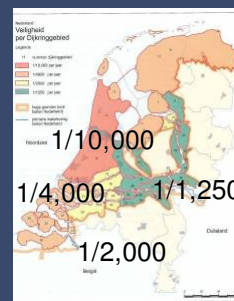
## National Water Partnership

### Opportunities

- Cooperation RWS and USACE leading to (ao) Dutch Perspective
- Missions to/from New Orleans (Schultz, Landrieu, van Gennip, Schaap, Huizinga)
- Individual contacts of (Dutch) companies
- Commitment of Dutch government and the Dutch embassy in cooperation with NWP
- Near future: 2g@there, multi-year program to further strengthen US/Dutch cooperation

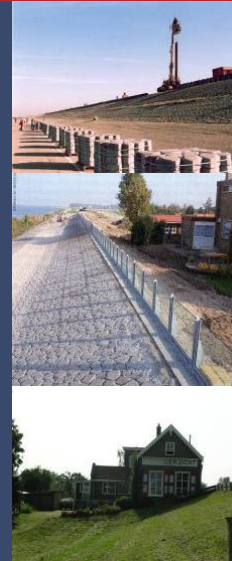
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### Brief history



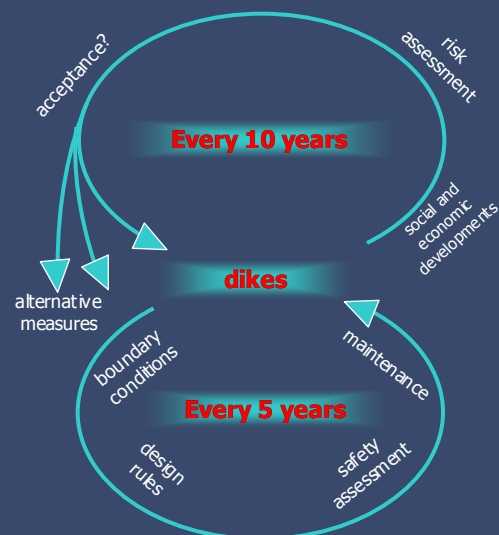
## National Levee Design and Monitoring Standards in the Netherlands

- Delta Law (1956): increase protection levels
- Law on Flood Defense (1996, updated 2005): maintain protection levels
  - Specify safety standards (in accordance with Delta Law)
  - Assessment in a five-year cycle
  - Evaluation of standards in a ten-year cycle (since 2005)
  - Specific spatial planning procedures for defense reinforcement (since 2005)
- Ministerial directive (every five years): provide legal status of new assessment rules and hydraulic conditions



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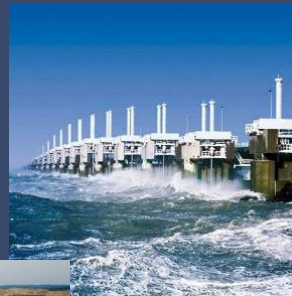
### Our Safety Standards are Based on Risks

- Consideration of economic loss
- Account for loss of life
- Consider cost/benefit



## National Levee Design and Monitoring Standards in the Netherlands

### Assessment in Practice, Scope (1)





## National Levee Design and Monitoring Standards in the Netherlands

### Assessment in Practice, Scope (2)



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## National Levee Design and Monitoring Standards in the Netherlands

### Assessment in Practice - Levels

- Basic, prescribed
- Detailed, prescribed
- Advanced, specialist input: not prescribed

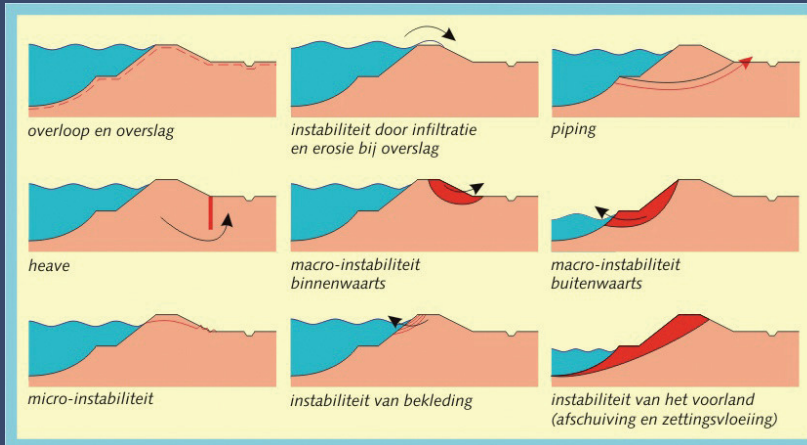
### Hydraulic Conditions: Prescribed



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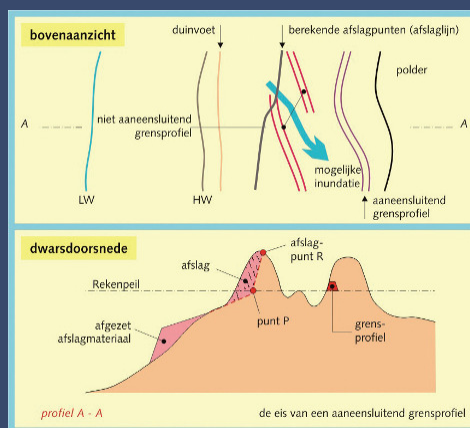
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### Assessment in Practice - Mechanisms Levees



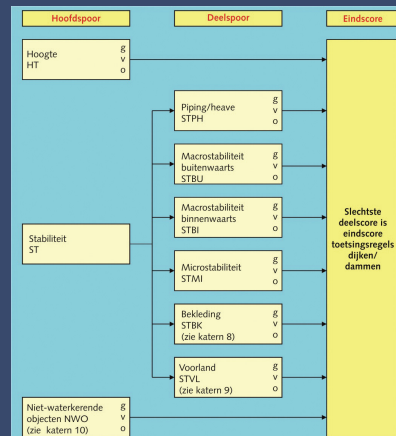
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### Failure Mechanisms - Dunes



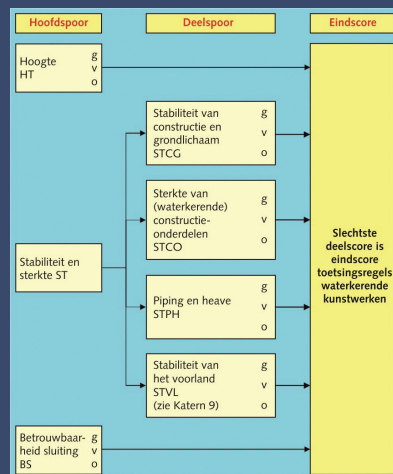
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### Assessment Scheme - Levees



## National Levee Design and Monitoring Standards in the Netherlands

### Assessment Scheme - Structures





## National Levee Design and Monitoring Standards in the Netherlands

### Organization of the Assessment

Entity	Responsibility
Ministry of Public Works and Water Management	<ul style="list-style-type: none"><li>• Responsible for preparation of:<ul style="list-style-type: none"><li>– Assessment master plan</li><li>– Assessment rules</li><li>– Hydraulic conditions</li></ul></li><li>• Report to parliament about assessment results</li></ul>
Rijkswaterstaat	<ul style="list-style-type: none"><li>• Execution of the work of the Ministry</li><li>• Defense manager of a set of crucial defenses (see below)</li></ul>
Provinces	<ul style="list-style-type: none"><li>• Supervise assessment in their territory</li><li>• Report to minister about results</li></ul>
Water boards	<ul style="list-style-type: none"><li>• Execute assessment in their territory</li><li>• Report to province about results</li></ul>

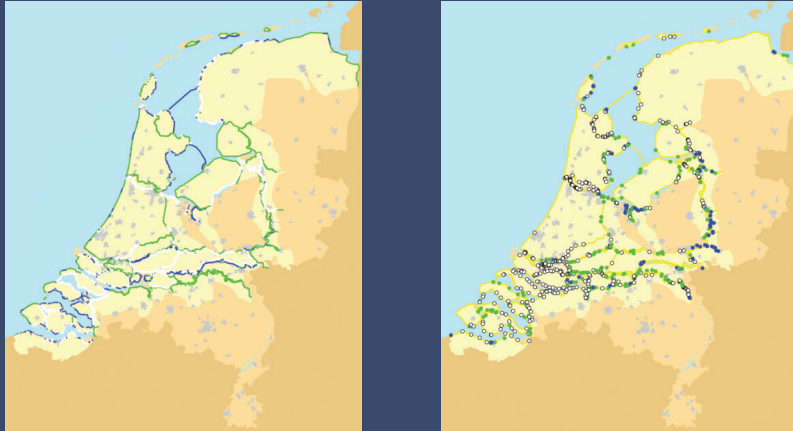
## National Levee Design and Monitoring Standards in the Netherlands

### Organization of the Assessment (2)

Entity	Responsibility
National inspection authority	<ul style="list-style-type: none"><li>• Quality assurance of the assessment process (nationally)</li></ul>
National expertise network (ENW)	<ul style="list-style-type: none"><li>• Quality control of assessment on technical level</li><li>• Specialist input on request of defense managers (trouble shooting)</li><li>• Proposals for improving safety standards and assessment tools</li></ul>
Other knowledge networks	<ul style="list-style-type: none"><li>• Development of rules/methods for specific areas of interest</li></ul>

## National Levee Design and Monitoring Standards in the Netherlands

### Direct Results of the Assessment (1)



## National Levee Design and Monitoring Standards in the Netherlands

### Direct Results of the Assessment (2)



## National Levee Design and Monitoring Standards in the Netherlands

### Indirect Results of the Assessment Cycle

- Has led to considerable improvement of flood defense management
- Has increased public awareness and support regarding flood protection
- Has improved levee technology
- Has improved monitoring technology

*In short: the assessment cycle has initiated continued growth*



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## National Levee Design and Monitoring Standards in the Netherlands

### Recent Developments and Future

- Towards a standard on system level
- Update of standards based on new risk estimates
- Further development of assessment tools
- New knowledge about our defenses
- Dutch water law, incorporating nine water-related laws into one (including law on flood defense)
- European flood directive (directive 2007/60/EC)

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## Conclusions

### The assessment cycle:

- Has a basis in Dutch law
- Provides a clear basis for the high water protection program
- Grants that changing conditions are incorporated in the protection system
- Initiates growth in Dutch flood defence management



*Questions?*